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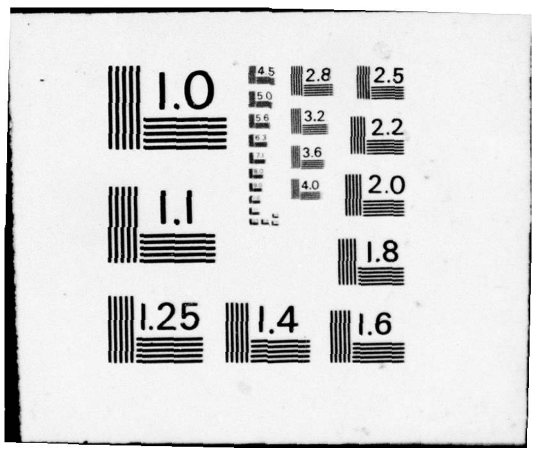
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AERO-ASTRONAUTICS REPORT NO. 133

PUBLICATIONS OF THE AERO-ASTRONAUTICS GROUP

1965-76

by

E.C. WILSON

RICE UNIVERSITY

1976

Publications of the Aero-Astronautics Group[1]

1965-76

by

E.C. WILSON[2]

Abstract. This document summarizes the research performed by the Aero-Astronautics Group of Rice University during the period 1965-76 under several AFOSR, NSF, and NASA grants. This research has been reported in 133 Aero-Astronautics Reports and 91 papers published in the open literature. It has spanned the following mathematical areas: (i) nonlinear equations, (ii) differential equations, (iii) two-point and multipoint boundary-value problems, (iv) mathematical programming, (v) optimal control, and (vi) calculus of variations. In these areas, it has led to the development of several new analytical and computational techniques.

Concerning applications, the research reported here is of interest in several areas of engineering, science, and economics. With particular regard to aerospace engineering, it applies to the following problem areas: (i) optimum atmospheric flight trajectories, (ii) optimum extra-atmospheric flight trajectories, (iii) optimum aerodynamic shapes, and (iv) optimum structures.

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[2] Secretary, Department of Mechanical Engineering and Materials Science, Rice University, Houston, Texas.

Key Words. Nonlinear equations, differential equations, two-point boundary-value problems, multipoint boundary-value problems, mathematical programming, optimal control, calculus of variations.

Numerical analysis, numerical methods, computing methods, computing techniques.

Systems theory, engineering systems, aerospace engineering, economics.

Optimum systems, optimum atmospheric flight trajectories, optimum extra-atmospheric flight trajectories, optimum aerodynamic shapes, optimum structures.

Contents

I. Introduction

This document summarizes the research performed by the Aero-Astronautics Group of Rice University during the period 1965-76. This research has been supported through the following US Government Grants:

Air Force Office of Scientific Research

AFOSR Grant No. AF-AFOSR-828-65, 1965-66

AFOSR Grant No. AF-AFOSR-828-67, 1967-71

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National Science Foundation

NSF Grant No. GP-18522, 1970

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NSF Grant No. GP-32453, 1972-73

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NSF Grant No. MPS-75-18488, 1975-76

NASA-Langley Research Center

NASA Grant No. NGR-44-006-034, 1965-66

NASA Grant No. NGR-44-006-045, 1966-67

NASA Grant No. NGR-44-006-063, 1967-68

NASA-Johnson Research Center

NASA Grant No. NGR-44-006-089, 1968-70

The personnel participating in the research effort included the following people:

Faculty Personnel

Prof. A. Miele
Prof. H.Y. Huang

Senior Personnel

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Dr. J.N. Damoulakis
Dr. V. Guerra
Dr. J.C. Heideman
Dr. R.R. Iyer
Dr. A.V. Levy
Dr. A. Mangiavacchi
Dr. A. Montalvo
Dr. R.E. Pritchard
Dr. F. Rossi
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Mr. A.K. Aggarwal
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Mr. S.L. Brown
Mr. J.W. Cantrell
Mr. J.P. Chambliss
Mr. J.R. Cloutier
Mr. G.M. Coggins
Mr. E.E. Cragg
Mr. J.N. Damoulakis
Mr. A. Esterle
Mr. S. Gonzalez
Mr. J.C. Heideman
Mr. H.Y. Huang
Mr. D.G. Hull
Mr. R.R. Iyer
Mr. A.V. Levy
Mr. C.T. Liu
Mr. A.H. Lusty, Jr.
Mr. B.P. Mohanty
Mr. P.E. Moseley
Mr. S. Naqvi
Mr. R.E. Pritchard
Mr. J.L. Tietze
Mr. K.H. Well
Mr. W.L. Wilson
Mr. A.K. Wu

As a partial result of research performed under the above grants, the following advanced degrees were awarded:

MS Degrees

A.K. Aggarwal
J.W. Cantrell
J.P. Chambliss
J.R. Cloutier
G.M. Coggins
E.E. Cragg
J.C. Heideman
H.Y. Huang
A.V. Levy
S. Naqvi
W.L. Wilson
A.K. Wu

PhD Degrees

A.K. Aggarwal
J.R. Cloutier
E.E. Cragg
J.N. Damoulakis
J.C. Heideman
H.Y. Huang
D.G. Hull
R.R. Iyer
A.V. Levy
A.H. Lusty, Jr.
P.E. Moseley
S. Naqvi
R.E. Pritchard
J.L. Tietze
K.H. Well

Over the period 1965-76, the research of the Aero-Astronautics Group has been concerned with the following mathematical areas: (i) nonlinear equations, (ii) differential equations, (iii) two-point and multipoint boundary-value problems, (iv) mathematical programming, (v) optimal control, and (vi) calculus of variations. In these areas, it has led to the development of several new analytical and computational techniques.

Concerning applications, the research reported here is of interest in several areas of engineering, science, and economics. With particular regard to aerospace engineering, it applies to the following problem areas: (i) optimum atmospheric flight trajectories, (ii) optimum extra-atmospheric flight trajectories,

(iii) optimum aerodynamic shapes, and (iv) optimum structures.

A list of the research reports of the Aero-Astronautics Group is given in Section II. In turn, Section III contains a list of the papers published in the open literature by members of the Aero-Astronautics Group.

Remark. Aero-Astronautics Report (AAR) and Aero-Astronautics Papers (AAP) can be obtained by writing to the following address:

Dr. Angelo Miele
Aero-Astronautics Group
230 Ryon Building
Rice University
Houston, Texas 77001

II. Reports of the Aero-Astronautics Group

AAR-1. MIELE, A., Extremal Problems in Aerodynamics, Rice University, Aero-Astronautics Report No. 1, 1965.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document summarizes the research performed by the Aero-Astronautics Group of Rice University during the period 1965-76 under several AFOSR, NSF, and NASA grants. This research has been reported in 133 Aero-Astronautics Reports and 91 papers published in the open literature. It has spanned the following mathematical areas: (i) non-

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19. KEY WORDS (Continued)

calculus of variations.

Numerical analysis, numerical methods, computing methods, computing techniques.

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20. ABSTRACT (continued)

cont.
linear equations; (ii) differential equations; (iii) two-point and multipoint boundary-value problems; (iv) mathematical programming; (v) optimal control; and (vi) calculus of variations. In these areas, it has led to the development of several new analytical and computational techniques.

Concerning applications, the research reported here is of interest in several areas of engineering, science, and economics. With particular regard to aerospace engineering, it applies to the following problem areas: (i) optimum atmospheric flight trajectories; (ii) optimum extra-atmospheric flight trajectories; (iii) optimum aerodynamic shapes; and (iv) optimum structures.